

IN THE CLAIMS:

1. (Currently Amended) A capacitive deionization - regeneration system comprising in combination:

(1) a battery of at least four electrochemical cells, each cell comprising at least one pair of adjacent electrodes including an electrosorptive medium having a high specific surface area and sorption capacity, formed on one or more surfaces of said electrodes;

each pair of said adjacent electrodes including at least one aperture; and

each pair of said adjacent electrodes forming an open channel, said open channel adapted to fluidly communicate with a subsequent open channel via said aperture to allow a fluid to flow across said electrosorptive medium and through the battery in a serpentine path,

(2) an electrical circuit adapted for controlling the continuous deionization and regeneration operation of said battery of cells, said electrical circuit adapted for switching the polarity of each pair of said electrodes during each deionization cycle of each of said cells; and

(3) a fluid circuit adapted for regulating the flow of a fluid through each of said cells under the control of said electrical circuit, in order to maintain a continuous deionization and regeneration operation of said battery of cells including a continuous output of deionized fluid from said system.

2. (Original) The system of claim 1 wherein said fluid circuit comprises an outlet for deionized fluid obtained from a deionization cycle operated at a positive polarity and a second outlet for deionized fluid obtained from a deionization cycle operated at a negative polarity.

3. (Original) The system of claim 1 wherein said electrical circuit adapted for electrostatically regenerating a fluid by shorting said cell or reversing said polarity of said cell.

4. (Previously Amended) The system of claim 1 wherein said electrosorptive medium of said electrodes is attached by fastening strips.

5. (Original) The system of claim 3 wherein said electrodes comprise a carbon aerogel composite.

6. (Original) The system of claim 4 wherein said electrosorptive medium is composed essentially of any, or a combination of: carbon aerogel composite; a packed volume of particulate carbon, carbon aerogel, metal, or Buckminster fullerene; a carbide or a composite of carbides that are stable at high temperatures, chemically resistant, and highly conductive with a resistivity ranging between about 10 \square ohm-cm and 2000 \square ohm- cm, selected from a group consisting essentially of TiC, ZrC, VC, NbC, TaC, UC, MoC, WC, Mo₂C, Cr₃C₂, or Ta₂C; a packed volume of porous titanium, platinum or other metal; a metal sponge, or metallic foam; reticulated vitreous carbon (RVC) impregnated in resorcinal/formaldehyde carbon aerogel; or a porous, conductive screen including an array of holes that have been photolithographically formed to optimize the volumetric specific surface area of said screen.

7. (Previously Amended) The system of claim 1 wherein a voltage above about 1.2 V to about 1.7 V is applied across said open channel.

8. (Previously Amended) A capacitive deionization - regeneration system comprising in combination:

at least two batteries of electrochemical cells, at least one of said batteries comprising at least three pair of electrodes wherein at least one pair of said pairs comprise electrodes that are spaced apart and positioned in a generally parallel relationship relative to each other for defining an open channel there between, and for allowing a free, unobstructed flow of fluid through said open channel, said open channel having no dimension open to the exterior of said cell, said electrodes comprising a bed of electrosorptive medium having high specific surface area and sorption capacity;

an electrical circuit adapted for controlling the continuous deionization and regeneration operation of said at least two batteries, said electrical circuit adapted for switching the polarity of each electrode of said pairs during each deionization cycle of said cell; and

a fluid circuit adapted for regulating the flow of a fluid through said at least two batteries under the control of said electrical circuit, in order to maintain a continuous deionization and regeneration operation of said batteries including a continuous output of deionized fluid from said system.

9. (Original) The system of claim 8 wherein said fluid circuit comprises said open channel having a serpentine path through said cells.

10. (Original) The system of claim 8 wherein said electrical circuit adapted for electrostatically regenerating a fluid by shorting said cells or reversing said polarity of said cells.

11. (Previously Amended) The system of claim 8 wherein at least one of said electrodes comprises: a structural support member, a conductive layer formed on at least one surface of said support member, a sheet of said high specific surface area electrosorptive medium secured to said conductive layer, and said support member including at least one aperture for allowing a fluid to flow through the electrode.

12. (Original) The system of claim 11 wherein said structural support member includes any of: a conductive substrate formed at least in part of any of titanium, platinum or other metal; or a dielectric substrate formed of any of printed circuit board material, epoxy board, or glass epoxy board.

13. (Original) The system of claim 8 wherein said electrosorptive medium comprises any, or a combination of: carbon aerogel composite; a packed volume of particulate carbon, carbon aerogel, metal, or Buckminster fullerene; a carbide or a composite of carbides that are stable at high temperatures, chemically resistant, and highly conductive with a resistivity ranging between about 10 \square ohm-cm and 2000 \square ohm- cm, selected from a group consisting essentially of TiC, ZrC, VC, NbC, TaC, UC, MoC, WC, Mo₂C, Cr₃C₂, or Ta₂C; a packed volume of porous titanium, platinum or other metal; a metal sponge, or metallic foam; reticulated vitreous carbon (RVC) impregnated in resorcinal/formaldehyde carbon aerogel; or a porous, conductive screen including an array of holes that have been photolithographically formed to optimize the volumetric specific surface area of said screen.

14. (Original) The system of claim 8 wherein a voltage of above about 1.2 V to about 1.7 V is applied to said open channel.

15. (Original) The system of claim 1 wherein an insulating spacing screen is positioned between said adjacent electrodes.

16. (Previously Amended) The system of Claim 15 wherein said insulating spacing screen comprises a material selected from the group consisting of polypropolene, polyethylene and polytetrafluoroethylene.

17. (Original) The system of Claim 1 wherein at least one of said adjacent electrodes comprises two or more surfaces of said electrosorptive medium that is adapted to contact an electrolyte.

18. (Original) The system of claim 8 wherein an insulating spacing screen is positioned between said adjacent electrodes.

19. (Previously Amended) The system of Claim 18 wherein said insulating spacing screen comprises a material selected from the group consisting of polypropolene, polyethylene and polytetrafluoroethylene.

20. (Original) The system of Claim 8 wherein at least one of said adjacent electrodes comprises two or more surfaces of said electrosorptive medium that is adapted to contact an electrolyte.